

# Work Order ID 80710

**\*80710\***

Page 1

February-28-12 8:31:51 AM

Item ID: D407-667-105TRN

Accept

**\*N900040100\***

Setup Start **\*NS1\***

Revision ID:

Stop **\*NS2\***

Item Name: Crosstube Turning Detail

Start Date: 28/02/2012 Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 13/03/2012 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals: Process Plan: MLJ

Date: 12/02/28 Tooling:

Date:

Run Start **\*NR1\***

QC:

Date: SPC (Y/N):

Date:

Stop **\*NR2\***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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Draw Nbr

Revision Nbr

D407-667-145

Rev C

100

0.00

**\*100\***

MORI SEIKI CNC LATHE LARGE

Mori Seiki

Memo

0.00

Mori Seiki CNC Lathe Large

1-Fill tube with sand & install plugs DT8673 on both ends as per Folio FA249

2-Turn first side as per Folio FA249

3-Blend transition lines only, \*\*do not sand whole tube\*\*:

FOLIO REV: FA

DWG REV: C

\*Use mill bastard file, brush file repeatedly with file card.

\*Do not use sandpaper coarser than 320 grit.

*Mgn. L 12/03/13*

110

QC1- Inspect dimensions to dimension sheet

0.00

**\*110\***

QC

Memo

0.00

Quality Control

*Mgn. L 12/03/13*

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

**Work Order ID 80710****\*80710\***

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Required Date: 13/03/2012 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals: Process Plan:

Date:

Tooling:

Date:

Run Start **\*NR1\***

QC:

Date:

SPC (Y/N):

Date:

Stop **\*NR2\***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
120	MORI SEIKI CNC LATHE LARGE	0.00							
<b>*120*</b>									
Mori Seiki	<b>Memo</b>	0.00							
Mori Seiki CNC Lathe Large	1-Turn second side as per Folio FA249								
	2-Blend transition lines only, **do not sand whole tube**: *Use mill bastard file, brush file repeatedly with file card. *Do not use sandpaper coarser than 320 grit. FOLIO REV: <u>AA</u> DWG REV: <u>C</u> 3-Remove sand and plugs								
	4-Scribe part # and batch # using vibrating stylus as per Dwg D206-667-145 inside of Cuff(Do not engrave on outside of tube)								
130	QC1- Inspect dimensions to dimension sheet	0.00							
<b>*130*</b>									
QC	<b>Memo</b>	0.00							
Quality Control									

mar. 12/03/13

MAY 12/03/13

W/O:		WORK ORDER CHANGES					
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**\*N900040100\***Setup Start **\*NS1\***

Revision ID:

Item Name: Crosstube Turning Detail

Stop **\*NS2\***

Start Date: 28/02/2012 Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 13/03/2012 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run Start **\*NR1\***

QC:




Date:

SPC (Y/N):

Date:

Stop **\*NR2\***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
140	QC8- Inspect parts - second check	0.00							
<b>*140*</b>									
QC	Memo	0.00							
Quality Control									
145		0.00							
<b>*145*</b>									
Crosstubes	Memo	0.00							
Crosstubes	GRIND ONLY TRANSITION LINES SMOOTH LONGITUDE WAY.								
150	Crosstubes Chemical Conversion	0.00							
<b>*150*</b>									
HandFXtube	Memo	0.00							
Hand Finishing Crosstubes									

 12-3-13 12-3-14 12-3-14

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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Required Date: 13/03/2012 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals: Process Plan:

Date:

Tooling:

Date:

Run Start **\*NR1\***

QC:

Date:

SPC (Y/N):

Date:

Stop **\*NR2\***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
160 <b>*160*</b> QC Quality Control	QC3- Inspect Part Finish <i>QC7</i> Memo	0.00 0.00							<i>DP 12-3-14</i>
170 <b>*170*</b> Packaging Packaging	Packaging Memo Identify and stock in Kanban rackLocation: <i>6/6</i>	0.00 0.00							<i>1 Ø</i> <i>MAN-L 12/03/14</i>
180 <b>*180*</b> QC Quality Control	QC21- Final Inspection - Work Order Release Memo	0.00 0.00							<i>12/3/14</i> <i>12-03-14</i>

W/O:		WORK ORDER CHANGES					
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# Picklist Print

February-28-12 8:32:11 AM

Page 1

Work Order ID: 80710

\*80710\*

Parent Item: D407-667-105TRN

\*D407-667-105TRN\*

Parent Item Name: Crosstube Turning Detail

Start Date: 28/02/2012

Required Date: 13/03/2012

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:a08.02.28 new issueEC  
IPP Rev B 08.04.02 Removed polish EC verified by: DD

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D6010-115		Manufactured	No			110	Each	19.0000	1	1			

\*D6010-115\*

\*\*

Crosstube Material

Location

Loc Qty

Loc Code

LG

19

38342

19

1 mm. 12/03/12

W/O:		WORK ORDER CHANGES					
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**NOTE:** Date & initial all entries

<b>DART AEROSPACE LTD</b>	<b>Work Order:</b>	80710
<b>Description:</b> Crosstube Assembly	<b>Part Number:</b>	D407-667-145
<b>Inspection Dwg:</b> D407-667-145 Rev: C		<b>Page 1 of 1</b>

### FIRST ARTICLE INSPECTION CHECKLIST

	Inspection Sheet Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.240	+0.005/-0.000	2.245	/		vern	CWC-08
	1.865	+0.005/-0.000	1.870	/			
	1.878	+0.005/-0.000	1.882	/			
	1.970	+0.005/-0.000	1.973	/			
	2.030	+0.005/-0.000	2.034	/			
	2.165	+0.005/-0.000	2.169	✓			
	0.125	+/-0.010	.125	/		vern	CWC-06
	R0.063	+/-0.010	.063	/		RG	
	R0.500	+/-0.010	.500	/		"	
SIDE B	R0.063	+/-0.010	.063	/		"	
	4.438	+/-0.030	4.440	/		vern	CWC-06
	2.240	+0.005/-0.000	2.244	/		vern	CWC-08
	1.865	+0.005/-0.000	1.870	/			
	1.878	+0.005/-0.000	1.881	/			
	1.970	+0.005/-0.000	1.973	/			
	2.030	+0.005/-0.000	2.034	/			
	2.165	+0.005/-0.000	2.160	✓			
	0.125	+/-0.010	.125	/		vern	CWC-08
	R0.063	+/-0.010	.063	/		RG	
	R0.500	+/-0.010	.500	/		"	
	R0.063	+/-0.010	.063	/		"	
	4.438	+/-0.030	4.446	✓		vern	CWC-06
	113.20	+/-0.020	113.20	✓		type	AMM-02

<b>Measured by:</b> <i>AMM</i>	<b>Audited by:</b> <i>DP</i>	<b>Preliminary Approval:</b>
<b>Date:</b> 12/03/12	<b>Date:</b> 12-3-13	<b>Date:</b>

Rev	Date	Change	Revised by	Approved
A	04.04.21	New Issue (P/O D407-667-105)	KJ/RF	
B	06.03.09	Dwg Rev updated	KJ/JLM	
C	09.06.11	Dwg Rev updated	KJ	
D	11.06.21	Tolerance revised for 4.438 dimension	KJ	<i>[Signature]</i>

W/O:		WORK ORDER CHANGES					
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Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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NOTE: Date & initial all entries

Item	Qty -145	Part Number	Description
1	X	D407-667-145	CROSSTUBE ASSEMBLY (407 HIGH FWD)
2	1	D6010-115	CROSSTUBE
3	2	D2873-043	NUT PLATE
4	2	D2873-045	NUT PLATE
5	2	D2891-1	SUPPORT
6	4	D3595-063-395	RUBBER CUSHION
7	4	MS21920-20	CLAMP (OR MS21920-21)
8	14	MS20601AD4W10	RIVET (OR NAS9302B-4-10)
9	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299- 947-100, TYPE II, CLASS 2 ADHESIVE)

# **GENERAL NOTES:**

- 1) MATERIAL: MANUFACTURED FROM D6010-115  
FINISHED LENGTH = 113.20±0.020
- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: SCRIBE DART PART NUMBER "D407-667-145" AND BATCH NUMBER ON  
INSIDE OF CUFF USING VIBRATING STYLUS.
- 7) WEIGHT: 17.8 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE.
- 9) RUN CUTTER OFF PART WHERE INDICATED. BLEND OUT EDGE LONGITUDINALLY,  
TRANSITION SHOULD BE SMOOTH.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 6 PASSES. MAXIMUM TUBE FLATTENING DUE  
TO BENDING IS 6% BASED ON O.D.
- 11) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 12) INSTALL D2891-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 PER  
QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 13) INSTALL MS21920-20 CLAMPS (OR -21) WITH D3595-063-395 RUBBER CUSHIONS TO SECURE  
THE D2891-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMP MECHANISMS  
ARE LOCATED ON CROSSTUBE SUPPORTS.
- 14) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE  
OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS  
SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT  
LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS ARE SHOWING IN  
SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

UNDER REVIEW

80710 MJS  
12/02/28

DEO ATTACHED

ECW #11-615  
11.07.26

UNDER REVIEW

RELEASED  
08/11/28 MJS

C	REVISE GENERAL NOTES/PART LIST (ZN D7-1); REORGANIZED VIEWS AND REFORMATTED DRAWING TO CURRENT STANDARDS. D3595-063-395 WAS D2856-400-694 (ZN D6-2 & A5-2); REMOVED REF. 7 ADD TOLERANCES (ZN C6-3, C4-3, D2-3); RELOCATED FLAG #6 (ZN A8-3) PER NCR 210; MOVED TURNING DETAIL & UPDATED TOLERANCE TO SHEET 4.	RF	08.11.06
B	ADD HOLES AND NUT PLATES FOR COMPATABILITY WITH BHT/AA SKUDTUBES	PH	05.07.26
A	NEW ISSUE	CP	02.05.08
REV.	DESCRIPTION	BY	DATE
DESIGN	RF	<b>DART AEROSPACE LTD</b> HAWKESBURY, ONTARIO, CANADA	
DRAWN	RF	DRAWING NO.	REV. C
CHECKED	RF	D407-667-145	SHEET 1 OF 4
MFG. APPR.	RF	TITLE	SCALE
APPROVED	RF	CROSSTUBE ASS'Y (407 HIGH FWD)	NTS
DE APPR.	RF	COPYRIGHT © 2002 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	
DATE	08.11.06		

W/O:		WORK ORDER CHANGES					
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**NOTE:** Date & initial all entries

8 7 6 5 4 3 2 1

8 7 6 5 4 3 2 1

12 D2891-1 SUPPORT  
2 PL  
15 MS21920-20 CLAMP  
4 PL  
13 D3595-063-395  
RUBBER CUSHION  
4 PL, (UNDER CLAMP)

D407-667-505  
A4-2  
B7-2

D2873-043  
NUT PLATE  
MS20601AD4W10  
RIVET, 4 PL  
D2873-045  
NUT PLATE  
MS20601AD4W10  
RIVET, 3 PL  
90°  
REF

VIEW A-A:  
CUFF DETAIL  
SCALE 4X

D407-667-145  
ASSEMBLY DETAIL  
(VIEW LOOKING FWD)

13 15 MS21920-20 CLAMP REF  
12 D2891-1 SUPPORT REF  
D3595-063-395  
RUBBER CUSHION  
REF  
D5-2

SECTION B-B  
SCALE 5X

DESIGN  
DRAWN  
CHECKED  
MFG. APPR.  
APPROVED  
DE APPR.  
DATE

DART AEROSPACE LTD  
HAWKESBURY, ONTARIO, CANADA  
DRAWING NO.  
D407-667-145  
REV. C  
SHEET 2 OF 4  
TITLE  
CROSSTUBE ASS'Y (407 HIGH FWD)  
SCALE  
NTS  
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80710

ECO #11.615  
11.07.26  
UNDER REVIEW  
09/10/13

RELEASE  
08/11/12

DEO ATTACHED

VIEW C-C:  
CUFF DETAIL  
SCALE 4X

D2873-043  
NUT PLATE  
MS20601AD4W10  
RIVET, 4 PL  
D2873-045  
NUT PLATE  
MS20601AD4W10  
RIVET, 3 PL  
90°  
REF

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

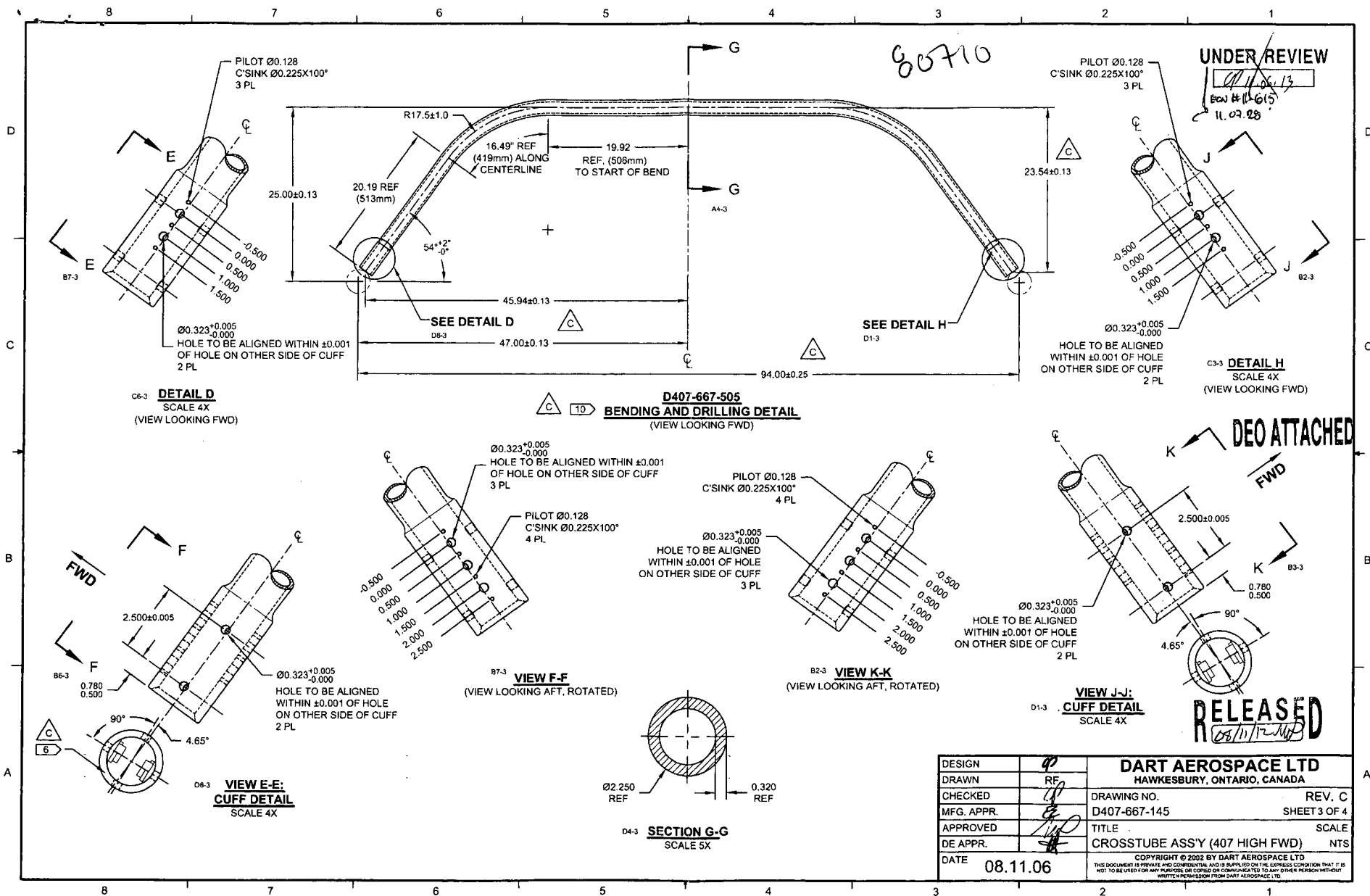
Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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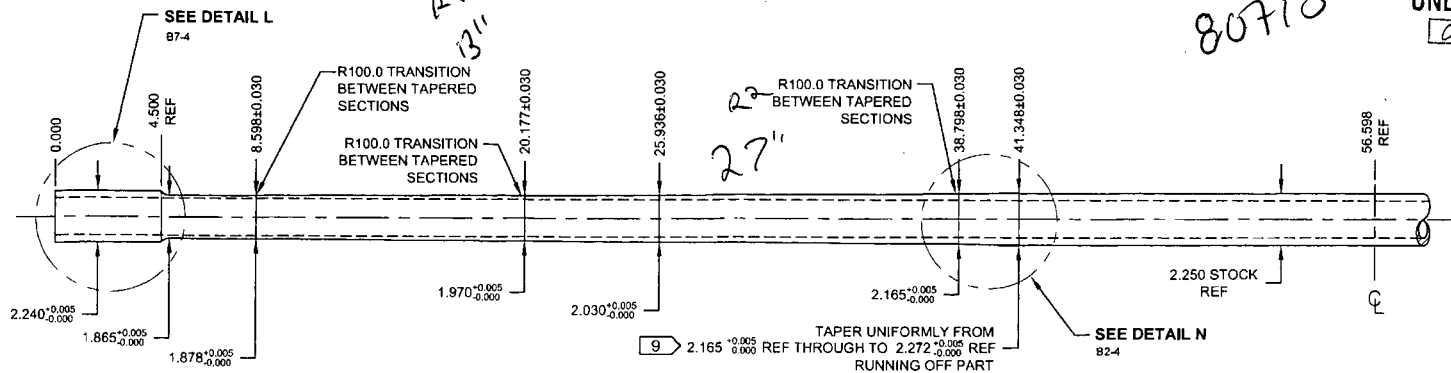
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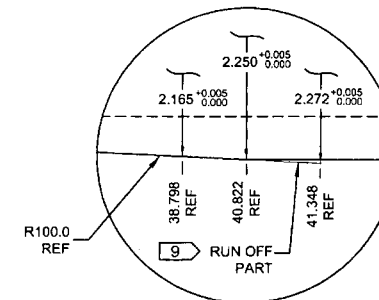
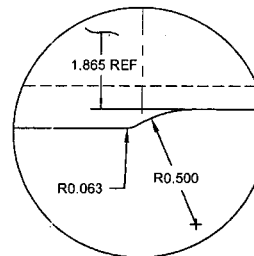
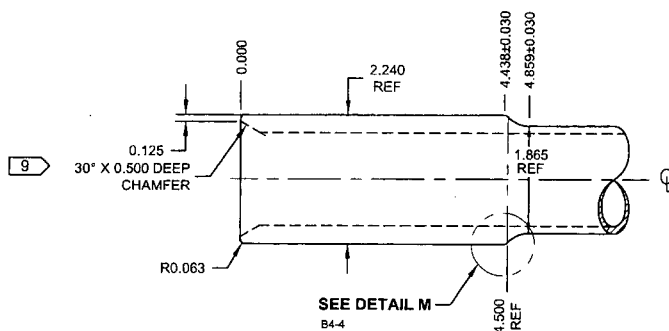
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**TURNING DETAIL**



DESIGN	9	<b>DART AEROSPACE LTD</b>	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	CP	DRAWING NO.	REV. C
MFG. APPR.	CP	D407-667-145	SHEET 4 OF 4
APPROVED	CP	TITLE	SCALE
DE APPR.	CP	CROSSTUBE ASS'Y (407 HIGH FWD)	NTS
DATE	08.11.06	COPYRIGHT © 2002 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSES OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	

DEO ATTACHED  
RELEASED  
08/11/2006

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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

DRAWING NO. D407-667-145	TITLE CROSSTUBE ASS'Y (407 HIGH FWD)	REV. C	DART AEROSPACE LTD ENGINEERING ORDER		D.E.O. NO. D407-667-145-C-1	SHEET NO. SHEET 1 OF 1	SCALE NTS
DRAWN 97	CHECKED ASS	MFG. APPR. 188	APPROVED WD		DE APPR. H		
DATE 11.07.15	DATE 11.07.22	DATE 11.07.22	DATE 11/07/22		DATE 11.07.21		

**PURPOSE:**

REPLACE MAGNOBOND WITH PROSEAL.

**CHANGE:**

**IS:**

Item	Qty -145	Part Number	Description
9	A/R	PROSEAL 890 B-2	SEALANT, AMS-S-8802 CLASS B-2

**WAS:**

9	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)
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NOTE 12 & 15, SHEET 1 IS AMENDED AS FOLLOWS:

**IS:**

- 12) TO INSTALL D2891-1 SUPPORT: ABRASE MATING SURFACE OF SUPPORT AND CROSSTUBE WITH 180-GRIT SANDPAPER AND REMOVE RESIDUE WITH MEK (OR EQUIVALENT). APPLY A 0.04" TO 0.07" THICK LAYER OF PROSEAL 890 CLASS B-2 (OR AMS-S-8802 CLASS B-2) SEALANT TO MATING SURFACE OF SUPPORT.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. **PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER PROSEAL 890 SEALANT HAS CURED FOR 72 HOURS.**

**WAS:**

- 12) INSTALL D2891-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

**RELEASED**  
2011-07-28  
WD

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes # No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

## ULTRA SONIC MEASURMENTS

Side	LOCATION on tube	R1	R2	R3	R4
A		.155	.221		
		.146	.209		
		.161	.221		
		.169	.231		
B				.153	.217
				.156	.219
				.160	.225
				.160	.235
				Part number	407-667-145
				Batch number	80710
				Measured By	man.l